URBAN WUE PROJECTIONS

WUE Comprehensive Evaluation
Technical Workshops

August 3, 2004

WUE Comprehensive Review

- ROD Commitment
- Look-back & Look-forward
  - Look-back: 2001-2004
  - Look-forward: 2005-2030
- Look-forward analysis covers
  - Ag
  - Urban
  - Recycling/Desal

Purpose of Look-forward

- What is conservation potential given
  - Existing Urban MOU
  - Urban Certification
  - Different amounts of financial assistance
- Six Projection Levels

Uses of Urban Look-forward

- WUE Program design & targets
- Common Assumptions and ISI
- Bulletin 160 Demand Analysis

Today's Workshop

- Look-forward urban conservation analysis
- Present draft findings
- Discuss methods, data, assumptions
- Highlight key assumptions and limitations
- Get feedback

Workshop Agenda

9:00 - 9:15 Introduction
- WUE Comprehensive Review Overview
- Purpose of Workshop

9:15 - 9: 30 WUE Comprehensive Analysis Projections

9:30 - 9:45 Conservation Activity Included in Analysis

9:45 - 10:45 Results
- Water savings by Projection Level, broken down by
  - Analysis Area
  - Flow Path - Recoverable and Irrecoverable
- Costs by Projection, broken down by
  - Locally cost-effective investment
  - State investment

10:45 - 11:00 Break

11:00 -11:30 Modeling Approach

11:30 - 12:00 Data, Assumptions, Issues

12:00 - 12:15 Questions & Discussion

12:15 - 12:30 Wrap-up & next steps

Ground Rules

- More material than time, so …
  - We'll try to answer questions as we go, but may need to move on to keep to schedule
  - May defer questions if they'll be addressed later in workshop
  - Can also submit written questions to us if question not answered during workshop

Urban Projections

- Projection 1: Reasonably Foreseeable
  - Local agencies implement BMPs at historic rate
  - State funding limited to remaining Prop. 50
  - Non-BMPs implemented only if state co-funded
- Projection 2: Locally Cost-effective
  - Local agencies implement BMPs if CE
  - Local agencies implement Non-BMPs if CE
  - State funding limited to remaining Prop. 50

Urban Projections

- Projection 3: Moderate Funding
  - Local agencies implement BMPs at historic rate
  - State funding $15 mil/yr thru 2030
  - Non-BMPs implemented only if state co-funded
- Projection 4: Locally CE + Moderate $
  - Local agencies implement BMPs if CE
  - Local agencies implement Non-BMPs if CE
  - State funding $15 mil/yr thru 2030

Urban Projections

- Projection 5: Locally CE + Significant $
  - Local agencies implement BMPs if CE
  - Local agencies implement Non-BMPs if CE
  - State funding $40 mil/yr thru 2014, then $10 mil/yr
- Projection 6: Technical Potential
  - 100% adoption of activities included in analysis
  - Economics not a factor
  - Not presented today

Analysis Regions

Conservation Measures

Residential	BMP 1 (SF, MF) BMP 2 (SF, MF) BMP 4 (SF) BMP 14 (SF, MF) ET-Cont. (SF)
CII	BMP 9 (surveys) CII Toilets (5 locations) Dishwashers Spray Valves Med. Sterilizers (2 types) Process Water

Conservation Measures

Landscape	BMP 5 Surveys BMP 5 Budgets Other than BMP 5
Utility	BMP 3

DRAFT RESULTS

Water Savings & Costs

STATEWIDE SUMMARY

		TAF/Year			
Projection #	***Projection Name***	***2005***	***2010***	***2020***	***20***
1	Reasonably Foreseeable	100	139	175	19
2	Locally CE	297	559	814	92
3	Moderate State $	100	191	347	51
4	Locally CE + Moderate State $	397	611	986	1,2
5	Locally CE + Significant State $	311	699	1,104	1,3
6	Technical Potential				

Reasonably Foreseeable*

	TAF/Year			
Hydrologic Region	***2005***	***2010***	***2020***	***2030***
Central Coast	5	5	5	5
Colorado River	0	0	0	0
North Coast	2	2	3	4
North Lahontan	0	0	0	0
Sacramento River	7	9	9	8
San Francisco Bay	17	23	31	28
San Joaquin River	1	2	2	2
South Coast	55	72	104	124
South Lahontan	0	0	0	0
Tulare Lake	1	1	0	0
State	**87**	**113**	**155**	**171**

* BMP 14 direct install implementation.

	TAF/Year			
Type of Loss	***2005***	***2010***	***2020***	***2030***
Recoverable loss	16	21	26	27
Irrecoverable loss	71	92	129	144
Total	**87**	**113**	**155**	**171**

* BMP 14 direct install implementation.

* Not inclusive of savings from Prop. 50

Locally Cost-Effective*

	TAF/Year			
Hydrologic Region	***2005***	***2010***	***2020***	***2030***
Central Coast	3	8	25	35
Colorado River	28	37	58	77
North Coast	3	6	11	13
North Lahontan	0	1	2	16
Sacramento River	3	2	1	26
San Francisco Bay	43	84	127	141
San Joaquin River	6	7	9	10
South Coast	190	378	544	569
South Lahontan	5	9	13	15
Tulare Lake	2	2	3	3
State	**284**	**533**	**793**	**906**
* BMP 14 direct install implementation.				

	TAF/Year			
Type of Loss	***2005***	***2010***	***2020***	***2030***
Recoverable loss	52	83	123	170
Irrecoverable loss	232	450	671	735
Total	**284**	**533**	**793**	**906**
* BMP 14 direct install implementation.				

* Not inclusive of savings from Prop. 50

Locally CE by Sector*

	TAF/Year			
Urban Sector	***2005***	***2010***	***2020***	***203***
Residential	56	89	195	19
CII	52	124	155	15
Landscape	125	223	319	40
Utility System	50	98	124	15
Total	**284**	**533**	**793**	**90**

* BMP 14 direct install implementation.

* Not inclusive of savings from Prop. 50

State-Leveraged Savings by Projection

		TAF/Year			
Projection #	Projection Name	2005	2010	2020	203
1	Reasonably Foreseeable	13	25	20	19
2	Locally CE	13	25	20	19
3	Moderate State $	13	78	192	34
4	Locally CE + Moderate State $	13	78	192	34
5	Locally CE + Significant State $	27	165	310	44
6	Technical Potential	NA	NA	NA	NA

State-Leveraged Savings by Region: P1&2

	TAF/Year			
Hydrologic Region	***2005***	***2010***	***2020***	***203***
Central Coast	1	1	1	0
Colorado River	1	1	0	0
North Coast	0	1	0	0
North Lahontan	0	0	0	0
Sacramento River	0	1	1	1
San Francisco Bay	5	9	9	8
San Joaquin River	2	5	5	5
South Coast	0	0	0	0
South Lahontan	1	2	0	0
Tulare Lake	2	5	5	5
State	**13**	**25**	**20**	**19**

* BMP 14 direct install implementation.

State-Leveraged Savings by Region: P3&4

	TAF/Year			
Hydrologic Region	***2005***	***2010***	***2020***	***203***
Central Coast	1	4	12	28
Colorado River	1	4	7	3
North Coast	0	3	4	11
North Lahontan	0	1	1	2
Sacramento River	0	3	11	21
San Francisco Bay	5	28	68	11(
San Joaquin River	2	14	37	56
South Coast	0	1	3	14
South Lahontan	1	6	11	3(
Tulare Lake	2	14	37	67
State	**13**	**78**	**192**	**34**

* BMP 14 direct install implementation.

State-Leveraged Savings by Region: P5

	TAF/Year			
Hydrologic Region	***2005***	***2010***	***2020***	***203***
Central Coast	2	13	26	43
Colorado River	1	7	9	6
North Coast	1	6	11	18
North Lahontan	0	2	3	4
Sacramento River	5	30	50	59
San Francisco Bay	6	33	57	98
San Joaquin River	4	22	51	63
South Coast	1	8	14	25
South Lahontan	3	16	28	46
Tulare Lake	5	28	61	86
State	**27**	**165**	**310**	**448**

* BMP 14 direct install implementation.

State-Leveraged Savings by Sector: P1&2

	TAF/Year			
Urban Sector	***2005***	***2010***	***2020***	***203***
Residential	5	11	10	1(
CII	3	5	1	0
Landscape	4	9	9	9
Utility System	0	1	0	0
Total	**13**	**25**	**20**	**1!**

* BMP 14 direct install implementation.

State-Leveraged Savings by Sector: P3&4

	TAF/Year			
Urban Sector	***2005***	***2010***	***2020***	***203***
Residential	5	33	86	10
CII	3	17	29	5
Landscape	4	27	75	18
Utility System	0	2	2	4
Total	**13**	**78**	**193**	**35**

* BMP 14 direct install implementation.

State-Leveraged Savings by Sector: P5

	TAF/Year			
Urban Sector	***2005***	***2010***	***2020***	***203***
Residential	11	67	135	14
CII	7	45	71	9
Landscape	8	52	108	21
Utility System	1	3	3	4
Total	**28**	**167**	**316**	**46**

* BMP 14 direct install implementation.

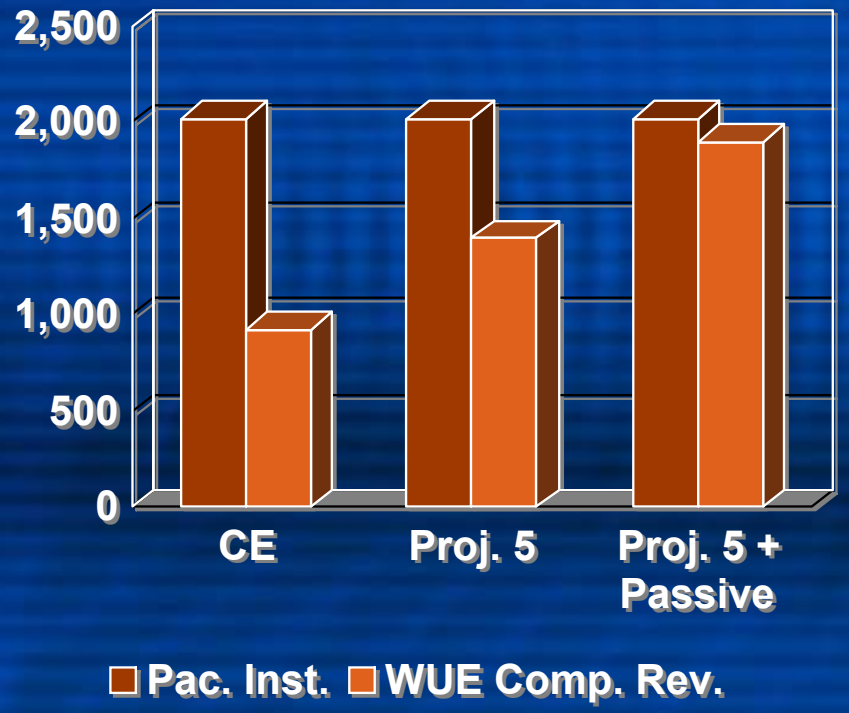
Comparison with CUWA CE*

- Both Use Water Agency Perspective
- Both account for remaining Prop. 50
- CUWA limited to BMPs
- MOU Renewal
- BMP History

* Urban Water Conservation Potential: 2003 Technical Update, March 2004, Draft Final Report

Comparison with Pac. Inst. CE*

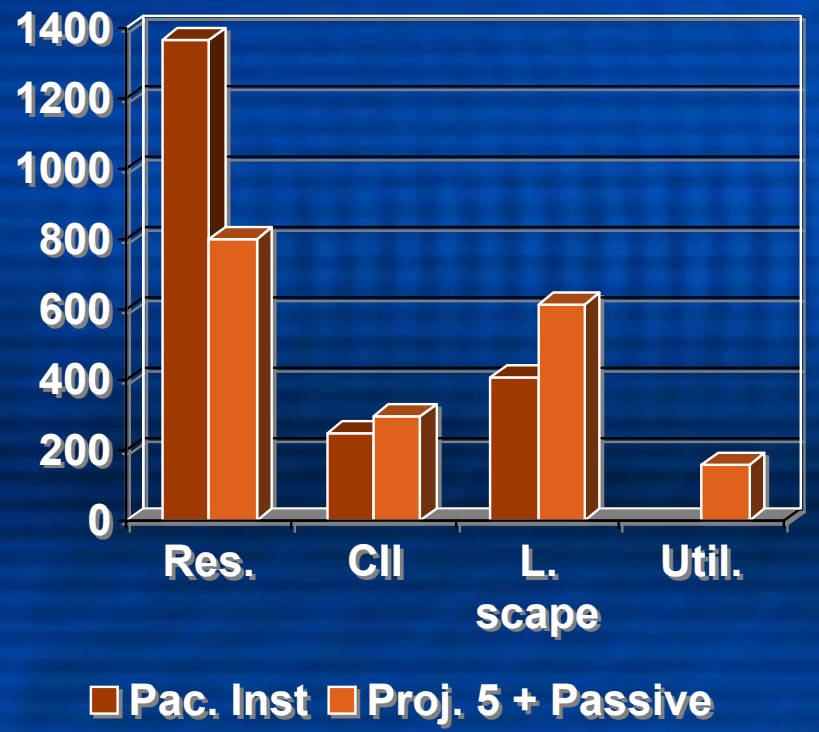
- WUE 2030 Projection
- CE analyses use different perspectives
- Comp. Rev. investment constrained
- Savings assumptions differ in some cases
- PI includes passive and active savings



* Waste Not, Want Not: The Potential for Urban Conservation in California, Nov. 2003.

Comparison with Pac. Inst. CE*

- Largest difference in residential sector
- CII estimates are close
- WUE Comp. landscape includes growth between 2000-2030
- PI doesn't estimate utility savings



* Waste Not, Want Not: The Potential for Urban Conservation in California, Nov. 2003.

Annual Costs ($000): P1&2

	2005	2010	2020	2030
Projection 1				
Local RF	28,532	52,980	54,766	29,704
State Grants	11,250	-	-	-
Local (State Leveraged)	35,589	-	-	-
TOTAL	**75,370**	**52,980**	**54,766**	**29,704**
Projection 2				
Local CE	114,712	224,447	103,776	110,304
State Grants	11,250	-	-	-
Local (State Leveraged)	35,589	-	-	-
TOTAL	**161,551**	**224,447**	**103,776**	**110,304**

Annual Costs ($000): P3&4

	2005	2010	2020	2030
Projection 3				
Local RF	28,532	52,98(	54,766	29,70⁴
State Grants	11,250	11,25(	11,250	11,25(
Local (State Leveraged)	35,589	39,486	62,949	55,48⁷
TOTAL	**75,370**	**103,71(**	**128,965**	**96,441**

Projection 4				
Local CE	114,712	224,44⁷	103,776	110,30⁴
State Grants	11,250	11,25(	11,250	11,25(
Local (State Leveraged)	35,589	39,486	62,949	55,48⁷
TOTAL	**161,551**	**275,18³**	**177,975**	**177,04(**

Annual Costs ($000): P5

	2005	2010	2020	2030
Projection 5				
Local CE	114,712	224,447	103,776	110,30
State Grants	30,000	29,128	5,377	7,50
Local (State Leveraged)	61,254	73,349	62,949	51,86
TOTAL	**205,966**	**326,924**	**172,102**	**169,67**

State Grants by Region ($000): P1&2

	2005	2010	2020	2030
Projections 1 & 2				
Central Coast	62	-	-	-
Colorado River	338	-	-	-
North Coast	163	-	-	-
North Lahontan	38	-	-	-
Sacramento River	963	-	-	-
San Francisco Bay	1,338	-	-	-
San Joaquin River	3,868	-	-	-
South Coast	100	-	-	-
South Lahontan	409	-	-	-
Tulare Lake	3,971	-	-	-
TOTAL	**11,250**	**-**	**-**	**-**

State Grants by Region ($000): P3&4

	2005	2010	2020	2030
Projections 3 & 4				
Central Coast	62	304	197	72
Colorado River	338	47	56	59
North Coast	163	113	137	83
North Lahontan	38	18	28	17
Sacramento River	963	2,354	56	2,765
San Francisco Bay	1,338	510	351	243
San Joaquin River	3,868	3,734	2,712	2,561
South Coast	100	51	1,032	2,475
South Lahontan	409	242	774	610
Tulare Lake	3,971	3,878	5,906	2,366
TOTAL	**11,250**	**11,250**	**11,250**	**11,250**

State Grants by Region ($000): P5

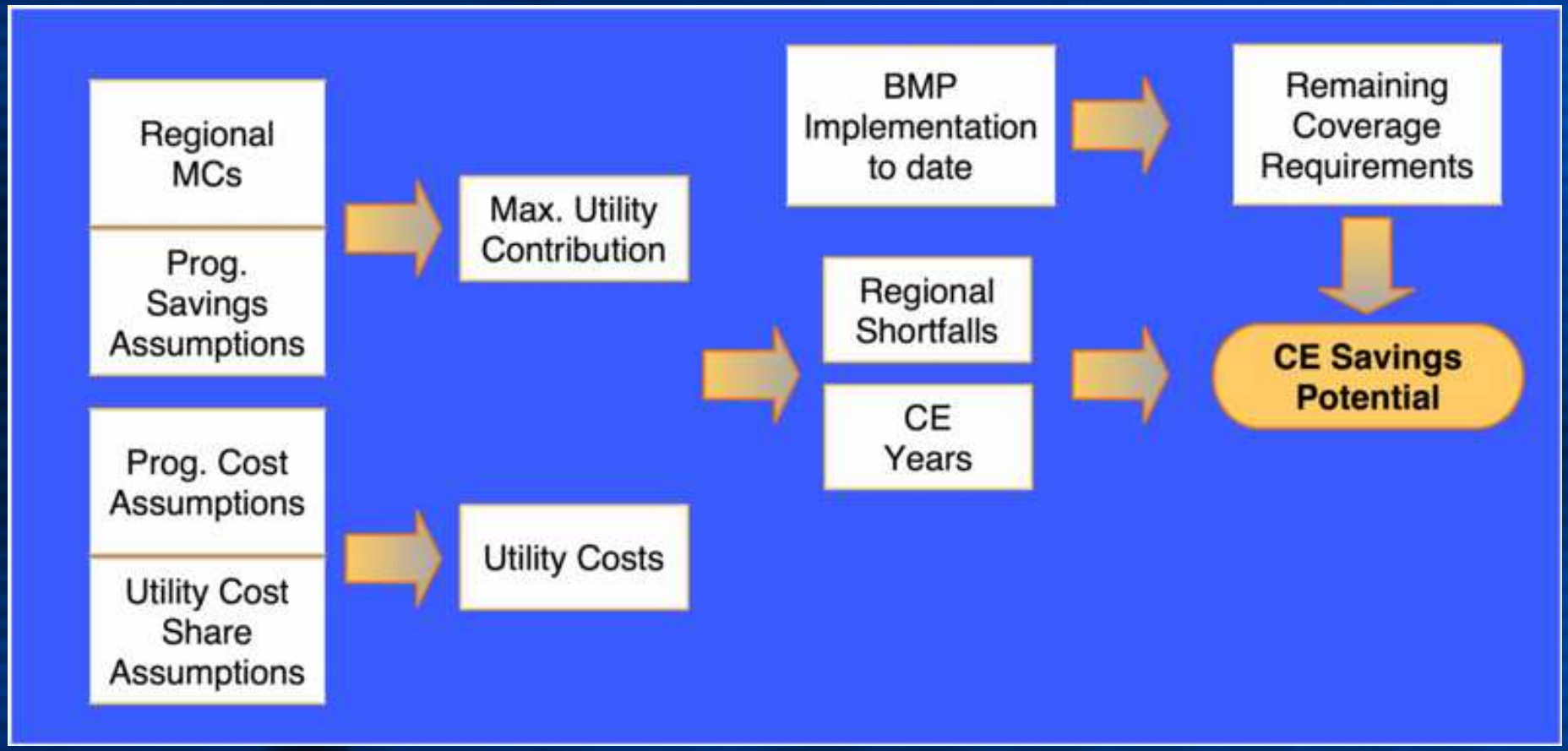
	2005	2010	2020	2030
Projection 5				
Central Coast	1,399	1,428	197	72
Colorado River	694	329	56	59
North Coast	483	399	137	83
North Lahontan	114	73	28	17
Sacramento River	13,863	13,803	56	2,598
San Francisco Bay	1,804	894	351	243
San Joaquin River	4,811	5,036	1,389	1,327
South Coast	394	374	444	574
South Lahontan	745	931	774	610
Tulare Lake	5,692	5,861	1,944	1,916
TOTAL	**30,000**	**29,128**	**5,377**	**7,500**

Final Notes about Results

- CE savings approach 1 MAF by 2030
- Grants add additional 0.35-0.46 MAF
- Savings are above and beyond what energy/plumb. code will achieve
- WUE Comp. review estimates fall between CUWA and Pac. Inst. - but this is largely apples-to-oranges
- Annual expenditure varies significantly by projection

MODELING APPROACH

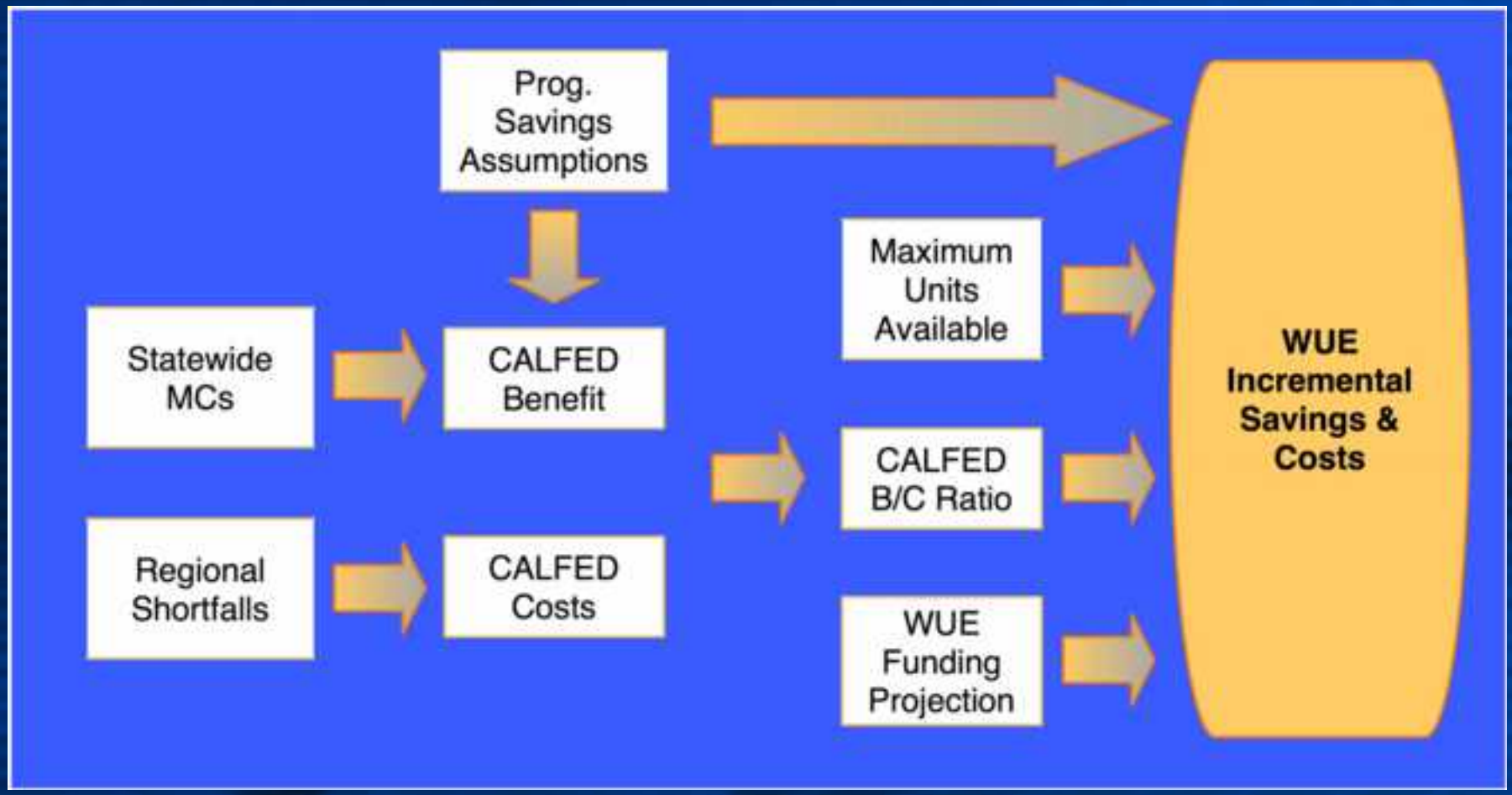
REGIONAL CE SAVINGS



REGIONAL CE ANALYSIS

- CE from Utility Perspective
- Utility benefits based on avoided cost of water supply
- Utility costs partially offset by customer cost-sharing
- Net Benefit > 0 then utility assumed to invest in BMP/Activity
- Level of investment governed by remaining coverage requirement or imposed investment schedule

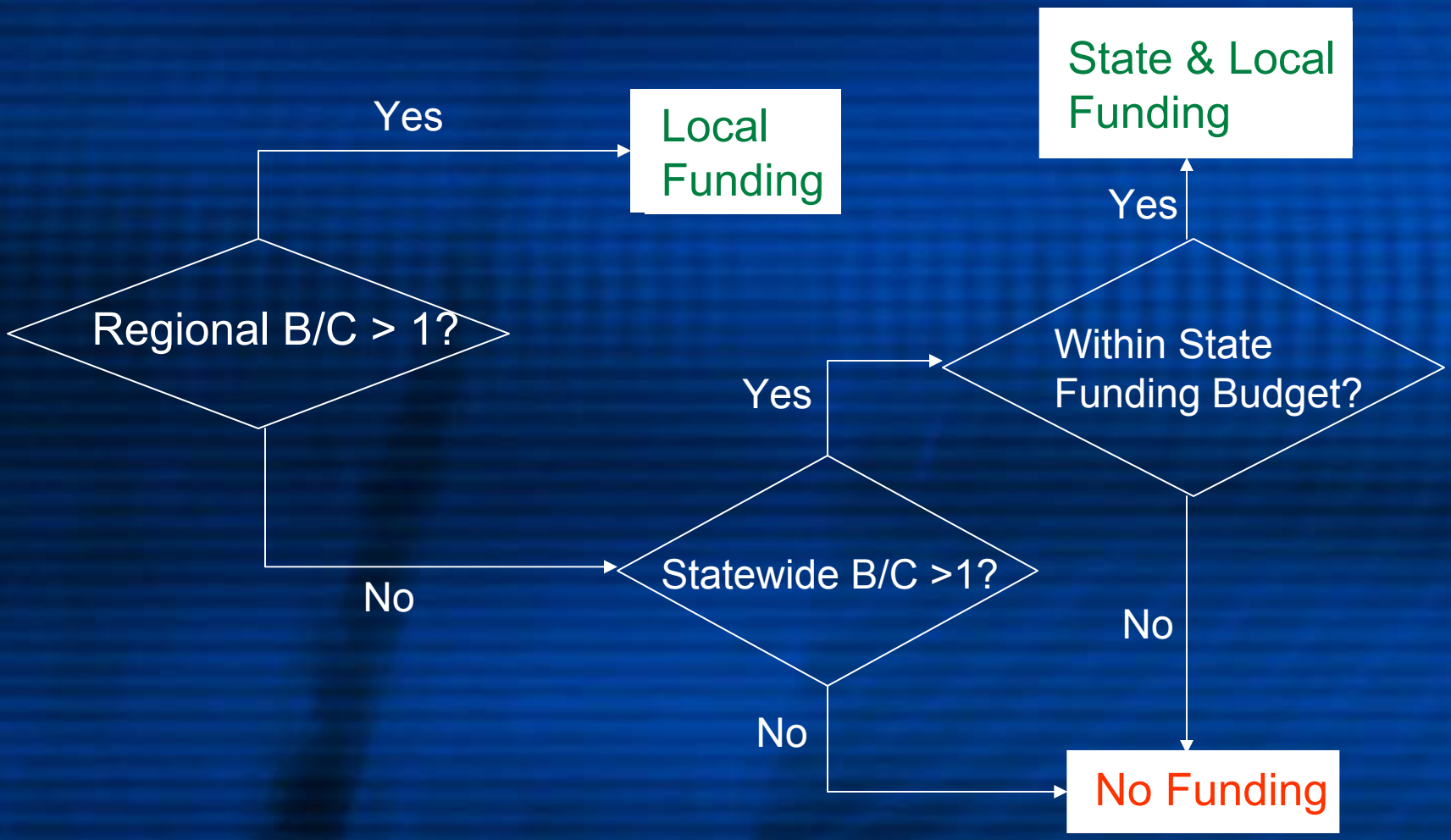
Grant Funding Analysis



STATE GRANT ANALYSIS

- State benefit based on statewide regional avoided cost
- State cost is regional shortfall derived from Regional CE Analysis
- BMPs/Activities ranked by state B/C ratio
- Level of State investment guided by
  - Projects with B/C > 1
  - Funding available to grant program
  - Remaining BMP coverage or imposed investment schedule

Economic Logic Recap



Sample Economic Analysis

- BMP 14
- Central Coast Region

Regional Economic Analysis

Measure cost: $235/Toilet

	2005	2010	2015	2020	2025	2030
PV Benefit	$112	$150	$197	$232	$245	$251
PV Net Benefit	($123)	($85)	($38)	($3)	$10	$16
CE Year?	No	No	No	No	Yes	Yes
Units Locally Funded	0	0	0	0	1,147	775

CE Years: 2022-2030

Grant Funding Analysis

	2005	2010	2015	2020	2025	2030
PV State Ben	$112	$150	$197	$232	$245	$251
PV State Cost	$123	$85	$38	$3	0	0
State B/C	0.91	1.77	5.19	75.32	N/A	N/A
Potential State Leveraged Units	0	3,725	2,516	1,699	0	0

Potential vs. Actual Leveraged Residential Units

		2005	2010	2015	2020	2025	2030
Proj. 1 &	Potential	0	3,725	2,516	1,699	0	0
	Actual	0	0	0	0	0	0
Proj. 3 &	Potential	0	3,725	2,516	1,699	0	0
	Actual	0	0	2,516	1,699	0	0
Proj. 5	Potential	0	3,725	2,516	1,699	0	0
	Actual	0	3,725	0	1,699	0	0

Data, Assumptions, Issues

Principle References

- AWWARF REUS
- CUWA (2001)
- Pacific Institute Waste Not, Want Not
- CUWCC
  - MOU, PBMP Study, Savings & Costs Study, CII ULFT Savings Study, Freeridership Study
- WUE Appropriate Urban Measurement
- Census 2000
- American Housing Survey
- DOF Population Projections
- DWR Production Survey
- DWR Bul. 160 Urban Use Estimates

Unit Savings

BMPs:	Initial Savings	Useful life or Savings Decay	Free rider Rate	Notes	Source
1. Residential Surveys					
Single-Family	15.0 gpd	15%		1	a
Multi-Family	6.6 gpd	15%		1	a
2. Residential Retrofits					
Single-Family	8.2 gpd	10%		2	a
Multi-Family	9.4 gpd	10%		2	a
3. System Water Audits	Varies by region				
4. Metering	0.18 afy	15 yrs			b
5. Landscape					
Surveys	0.8 afy	10%		3	c
Budgets	15%			4	d
9. CII Surveys	1.3 afy	12 yrs		5	e
14. ULFT (Direct Install)					
Single-Family	MOU Exh. 6	4%	20%	6	a
Multi-Family	MOU Exh. 6	4%	20%	6	a
Non-BMPs:					
Residential					
ET Controllers	0.07 afy	15 yrs			f
CII Indoor					
Medical Sterilizers					
Jacket & Chamber Cond. Mod	1.4 afy	20 yrs			f
Ejector Water Mod.	1.9 afy	20 yrs			f
Toilets	Varies by location			7	g
Restaurant Dishwashers	100 gpd	8 yrs			h
Restaurant Pre-Rinse Valves	137 gpd	5 yrs			f
Industrial Process	120 TAF			8	h
CII Outdoor					
General Landscape	414 TAF			8	h

Unit Costs

BMPs:	Cost in Year 2005	Notes	Source
1. Residential Surveys			
Single-Family	$137	1	a
Multi-Family	$361	1	a
2. Residential Retrofits			
Single-Family	$22	2	a
Multi-Family	$16	2	a
3. System Water Audits	$1,810	3	a
4. Metering	$601	1	a
5. Landscape			
Surveys	$1,366	1	a
Budgets	$431	1	a
9. CII Surveys	$4,043	1	a
14. ULFT (Direct Install)			
Single-Family	$235	2	a
Multi-Family	$162	2	a
Non-BMPs:			
Residential			
ET Controllers	$175	4	b
CII Indoor			
Medical Sterilizers			
Jacket & Chamber Cond. Mod	$2,875	4	b
Ejector Water Mod.	$8,453	4	b
Toilets	$155	4	c
Restaurant Dishwashers	$150	4	c
Restaurant Pre-Rinse Valves	$181	4	c
Industrial Process			
Minimum	$2	4	c
Maximum	$1,900	4	c
CII Outdoor			
General Landscape	$355	3	c
* All costs expressed in year 2003 constant dollars			

Notes:

1. Per account
2. Per residential unit
3. Per acre-foot saved
4. Per device

Sources:

a. CUWA, *Urban Water Conservation Potential*, 2001
b. CUWCC, *A Report on Potential Best Management Practices*, 2004
c. Pacific Institute, *Waste Not, Want Not:The Potential for Urban Water Conservation in California*, 2004

Utility Avoided Costs ($/AF)

		Central Coast	Colorado River	North Coast	North Lahontan	Sacramento River	San Francisco Bay	San Joaquin River	South Coast	South Lahontan	Tulare Lake
2000		$154	$200	$200	$200	$40	$127	$133	$639	$58	$127
2001		$152	$206	$206	$206	$40	$131	$133	$621	$58	$128
2002		$152	$212	$212	$212	$40	$131	$134	$603	$58	$129
2003		$148	$219	$219	$219	$41	$249	$135	$651	$59	$129
2004		$153	$225	$225	$225	$41	$289	$136	$642	$274	$130
2005		$148	$232	$232	$232	$41	$308	$137	$643	$276	$130
2006		$149	$239	$239	$239	$41	$311	$138	$653	$277	$131
2007		$154	$246	$246	$246	$41	$378	$139	$669	$278	$132
2008		$156	$253	$253	$253	$42	$378	$139	$683	$280	$132
2009		$156	$261	$261	$261	$42	$400	$140	$691	$281	$133
2010		$156	$269	$269	$269	$42	$439	$141	$697	$282	$134
2011		$172	$277	$277	$277	$42	$471	$142	$693	$284	$134
2012		$191	$285	$285	$285	$42	$505	$143	$682	$285	$135
2013		$212	$294	$294	$294	$43	$491	$144	$671	$286	$136
2014		$238	$303	$303	$303	$43	$498	$145	$674	$288	$136
2015		$269	$312	$312	$312	$43	$474	$146	$677	$289	$137
2016		$305	$321	$321	$321	$43	$480	$147	$681	$291	$138
2017		$347	$331	$331	$331	$43	$487	$148	$684	$292	$138
2018		$397	$340	$340	$340	$44	$494	$149	$688	$293	$139
2019		$456	$351	$351	$351	$44	$502	$150	$692	$295	$140
2020		$511	$361	$361	$361	$44	$583	$151	$696	$296	$140
2021		$521	$372	$372	$372	$44	$591	$152	$700	$298	$141
2022		$532	$383	$383	$383	$44	$599	$153	$704	$299	$142
2023		$542	$395	$395	$395	$45	$607	$154	$708	$301	$142
2024		$553	$407	$407	$407	$45	$615	$155	$713	$302	$143
2025		$564	$419	$419	$419	$45	$623	$156	$718	$304	$144
2026		$578	$431	$431	$431	$45	$632	$157	$722	$305	$144
2027		$592	$444	$444	$444	$46	$642	$158	$727	$307	$145
2028		$606	$458	$458	$458	$46	$652	$159	$733	$308	$146
2029		$620	$471	$471	$471	$46	$661	$160	$738	$309	$146
2030		$634	$485	$485	$485	$189	$671	$161	$743	$311	$147

Statewide Avoided Costs ($/AF)

	San Francisco Bay	South Coast
2000	$427	$345
2001	$427	$345
2002	$427	$345
2003	$427	$345
2004	$427	$345
2005	$427	$445
2006	$427	$458
2007	$427	$471
2008	$427	$484
2009	$427	$497
2010	$427	$510
2011	$428	$515
2012	$430	$521
2013	$431	$526
2014	$432	$531
2015	$433	$537
2016	$449	$553
2017	$464	$569
2018	$480	$585
2019	$495	$601
2020	$511	$617
2021	$521	$644
2022	$532	$670
2023	$542	$696
2024	$553	$722
2025	$564	$748
2026	$578	$791
2027	$592	$834
2028	$606	$877
2029	$620	$920
2030	$634	$963

1 All figures expressed in constant 2003 dollars.

Pop, Housing, Device Counts

- Pop. & housing
- Plumbing fixtures
- Unmetered residences
- Residential ET-controller potential
- CII Accts & Landscape Use
- CII ULFTs, Dishwashers, Spray valves, Med. Sterilizers
- Industrial process savings potential
- CII Landscape savings potential
- BMP implementation to-date

Key Assumptions/Issues

- Local avoided costs
  - Limited to water supply & infrastructure
  - Plugged values for 3 regions
- Statewide benefit estimation
- Real discount rate = 3%
- Grant allocation constraints
- Measure investment rates
- Measure cost escalation
- Customer cost sharing
- Reasonably foreseeable estimate exclusions
- Recoverable versus irrecoverable water loss

Key Assumptions/Issues

- BMP implementation to date
- BMP regional coverage accounting
- BMP 14 direct distribution assumed
- BMP 4 & future meter code req’mt
- BMP 6 & future efficiency code req’mt
- MOU Renewal
- 75% of grant funds go towards implementation